

atories. To anyone interested either in the technique or in attempting to secure a more thoroughgoing system in this country, Prof. Giglioli's book will provide a storehouse of information.

We have before had occasion to comment upon the gigantic undertaking of the United States Department of Agriculture, which has embarked on the preparation of a map of the soils of the whole country on a scale of one inch to the mile, accompanied by analyses of each soil type with descriptions of its agricultural features and suitability to particular crops and methods of management. Criticism has not been wanting of the manner in which the work is being executed, but when something like 26,000 square miles are being surveyed and mapped in the course of a year at a cost of about 12s. per square mile little more than a first approximation can be expected. Objection has been taken to the system of adopting a local name, e.g. Norfolk sand, attaching it to a given soil type, and using it all over the continent for soils of that category, whatever their situation or origin. But the argument is after all a formal one, and the value or otherwise of the survey can only be judged by the farmer on the spot, who finds that it does or does not represent his own soil conditions and assist him to utilise them to the best advantage.

To the foreign reader these volumes¹ are chiefly valuable as giving details of the nature of the soil, the climate, and other factors of the notable farming areas in the United States. Here one can compare the conditions under which the very different wheats of the north-west or of the Pacific slope are grown, or make out the climatic and soil requirements of such crops as cotton in Louisiana or tobacco in Connecticut. We miss in the present volume the photographs of the country which, to the outsider at least, were one of the most interesting features in the former issues.

For many years Mr. T. Jamieson has been carrying on a series of agricultural experiments, or rather demonstrations, on a comparatively small scale, but in a very careful and neat fashion. Reports on the work done have been issued from time to time, and now the results, which extend over something like twenty-eight years, have been gathered together in the little volume before us.² The experiments illustrate the well known principles of plant nutrition, and the account of them affords a brightly written *résumé* of the elementary facts connected with manures and their application to various crops. When here and there we read that this or that fundamental fact has been discovered or proved by the Aberdeenshire Research Association, much as though Mr. Jamieson should tell us that he has discovered water is composed of eight parts of oxygen and one of hydrogen, we can only admire the innocence in which Mr. Jamieson has managed to preserve his mind. Not for him the knowledge of good or evil that comes of reading other men's work, either past or contemporary. We miss, indeed, in this volume some of Mr. Jamieson's engaging speculations, as when, in his 1903 report, he told us that potash "appears to be the element chosen in nature to neutralise acidity, and facilitate transmission within the plant, for which purpose it is specially fitted by its alkalinity, solubility and soft or slippery character. Soda, which closely resembles it, but is of a harder drier nature (as seen in the soft Potash Soap as compared with the hard

Soda Soap) is unable to take the place of Potash in plants, as has been found by former experiments." But as a result the book forms a sufficiently sound and quite clearly written introduction to agricultural chemistry, which, like a visit to Mr. Jamieson's orderly demonstration plots at Glasterberry, may well be useful to set farmers thinking about the way their crops grow.

NOTES.

THE address on "Imperial Defence" delivered by Lord Roberts at a special meeting of the London Chamber of Commerce on Tuesday was a clear statement of the unsatisfactory condition of the armed forces of this country, in comparison with those of other great military Powers. Lord Roberts believes that we could not hope to be successful against an enemy of anything like equal strength, trained and organised as are the armies of leading nations. It appears, therefore, that we are as unprepared for war as Sir Norman Lockyer showed we are for the industrial competition of the future, in his presidential address to the British Association; and as to the way to remedy our deficiencies Lord Roberts's address—*mutatis mutandis*—supports the views expressed on that occasion. Higher education and scientific study must be applied to the arts of war as well as to those of peace if our country is to occupy a position in the first rank of progressive nations. Less attention must be paid to such trivial matters as the shapes of headdresses or the cuts of jackets, and more must be given to education and scientific training from early youth. In the war in the Far East, the Japanese have been successful because of their superior intelligence and scientific spirit. Let our statesmen learn from this that intellectual efficiency is now a truer safeguard of a nation than physical strength.

THE Government Eclipse Expedition organised by the Solar Physics Observatory will leave for Gibraltar on Friday. The expedition, in charge of Sir Norman Lockyer, K.C.B., will tranship there to H.M.S. *Venus*, which will proceed to Palma, where, by permission of the Spanish Government, the instruments will be erected. Mr. Howard Payn, one of the volunteer observers, is already there superintending the location of piers for the instruments. It was originally intended to observe at Philippeville, as Bona is occupied by two American parties, but the French Government would not give the necessary authorisation.

THE official party of the British Association, consisting of the president-elect and general and sectional officers, as well as other leading representatives of science, left Southampton on Saturday last by the mail steamer *Saxon* to attend the meeting of the association in South Africa.

DR. A. C. HOUSTON has been appointed director of water examinations under the Metropolitan Water Board.

THE death is announced, at the age of forty-six years, of Mr. H. Lamb, of Maidstone, author of "The Flora of Maidstone."

A REUTER telegram from Halifax, Nova Scotia, states that the Arctic exploration steamer, the *Roosevelt*, sailed from Sydney, Nova Scotia, on July 26. Commander Peary said he hopes to succeed in reaching the Pole, if not early in 1906, then the next year. He proposes to start on his final dash for the Pole from the eighty-fourth parallel.

ACCORDING to the *British Medical Journal*, a new society has been started in Paris for the scientific study of tuber-

¹ "Field Operations of the Bureau of Soils, 1903." Fifth Report. Pp. 1310, and a case containing 78 maps. (Washington: U.S. Department of Agriculture, Bureau of Soils, 1904.)

² "Science and Practice of Agriculture—Farmer's Handbook." By T. Jamieson, Director of the Aberdeenshire Agricultural Research Association. Pp. 173. (Aberdeen: The Author, 10 Belmont Street, 1905.) Price 2s. 6d.

culosis. The work of the society is to be purely scientific. The membership is restricted to thirty members, who are to be chosen irrespective of school or opinion, and there is to be no president. The members are in turn to preside at the meetings.

At the opening meeting of the council of the Liverpool Institute of Tropical Research, held on Monday, Sir Alfred Jones, the chairman, remarked that in many respects countries such as Germany, France, and Belgium are applying scientific methods to their commercial enterprises, especially to those conducted in the tropics, with greater success than Great Britain; and that it is necessary for the British merchant to bestir himself and take advantage of every assistance that science can offer. He guaranteed the institute 1000*l.* a year for four years; and among other guarantees were:—Mr. W. H. Lever, 1000*l.* a year for four years; Mr. T. Sutton Timmis, 250*l.* a year. It is proposed to take steps to obtain a charter of incorporation for the institute.

THE tenth session of the International Statistical Institute was opened on Monday by the Prince of Wales, as honorary president of the institute, and of the Royal Statistical Society. In the course of his address, the Prince said:—"My revered grandfather, the late Prince Consort, who did so much for the progress of science, was instrumental in rendering special assistance to the first effort of statistical science to secure for itself an assured and prominent position in the ranks of the older and better recognised sciences. Quetelet, whose name stands pre-eminent in that science, was at one time the Prince Consort's mathematical teacher, and later on his close personal friend. It was on the occasion of our great exhibition of 1851 that a large and distinguished company of statisticians was assembled in London. It was chiefly at the instigation of Quetelet that the question of instituting periodical international congresses for the discussion of questions of common interest and international concern was proposed. In consequence of this proposal an international organisation was formed, and the first international statistical congress was held in Brussels in 1853. Later on, in 1860, London welcomed the international congress, which met under the presidency of the Prince Consort, who, in his opening address, remarked:—"The importance of these international congresses cannot be overrated. They not only awaken public attention to the value of these pursuits by bringing together men of all countries who devote their lives to this work, and who are thus enabled to exchange their thoughts and varied experiences. They also pave the way to an agreement among different Governments and nations to follow up these common inquiries in a common spirit, by a common method and for a common end." This watchword of the congress of 1860 I would endeavour to commend to the congress of 1905 as worthily embodying its aims and its objects. National and social tendencies are to-day capable of increasingly accurate measurement with the aid of the very numerous statistical tabulations which now exist. In the future all branches of social science must look for their advancement and increase of precision to the continually improving character of the raw material furnished them by statisticians. For scientific progress, however, a primary essential is active and effective cooperation among scientific workers in all countries in order that publicity can be given to their results and uniformity obtained in the collection and arrangement of data for the purpose of their common employment."

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THE first number of a periodical for the publication of original investigations in economic biology will appear on September 29. The new magazine will be entitled the *Journal of Economic Biology*; and will be edited by Mr. W. E. Collinge, with the cooperation of Prof. A. H. R. Buller, Prof. G. H. Carpenter, Mr. R. Newstead, and Mr. A. E. Shipley, F.R.S.

Nos. 1 and 2 of vol. xxvi. of Notes from the Leyden Museum are entirely occupied by a memoir by Dr. O. Finsch on the birds collected by Dr. A. W. Nieuwenhuis in Dutch Borneo, more especially in the districts of Mahakam and Kajan. No less than 209 species were represented in the collection. The paper is illustrated with a coloured plate of the new species *Poliolophus nieuwenhuisi*, as well as with a map of the districts traversed by the explorer.

THE most generally interesting item in the June number of the *Victorian Naturalist* is the description by Mr. J. A. Hill of fights between two species of ants. One of the two is the large soldier-ant (*Formica purpurea*), a species which forms huge nests, and is capable of overpowering such creatures as small snakes. Nevertheless, this species is vanquished and exterminated by a small black ant scarcely one-third its size, the battles between the two often lasting months, and the victors finally taking possession of the nests of the vanquished.

At the annual meeting held in May last of the Boston Society of Natural History, the curator of the museum reported (*Proceedings*, vol. xxxii., No. 5) that the plan for re-arranging the collections referred to at the previous meeting had been in great measure carried out, and that the New England mammals and birds now occupy all the cases on the main floor of the building with the exception of one temporarily devoted to the palæontology of the district. This special attention to the proper display of the local fauna is a feature which should be copied by all provincial museums.

THE July number of the *Zoologist* contains a full report of a lecture on the migration of birds delivered at the recent International Ornithological Congress by Mr. Otto Herman, director of the Hungarian Central Office of Ornithology. The lecturer directed special attention to work which had been accomplished in Hungary in the matter of recording the dates of arrival and departure of migratory species by means of the services of a very large number of observers scattered all over the country. It has been ascertained, for example, that it takes one hundred and five days for swallows to complete their migration throughout Europe, that is to say, from Gibraltar in the south to Lulea in the north, the young being fully fledged in the former locality by the time the old birds have reached the latter. Even in Hungary itself the period of arrival may last as long as seventy days, the time that the species spends in that country averaging one hundred and sixty-seven days.

IN recording a collection of fishes obtained by Dr. B. Dean from Negros Island, Philippines, Messrs. Jordan and Seale (*Proc. U.S. Nat. Mus.*, No. 1407) take occasion to mention that a large percentage of the small species, so often neglected by collectors, appear to be new. Taken generally, the Philippine fish fauna seems to be very similar to that of the Indo-Malayan archipelago, although a few species are identical with Indian forms. In the course of their list the authors give an example of one of those transpositions of generic names which are so hostile to the real progress of zoology. In this particular

instance the name *Amia*, so universally in use for the American bow-fin, is employed to designate the perch-like fishes commonly known as Apogon.

WE have recently received five parts of the *Proceedings of the U.S. National Museum*. In the first of these (No. 1408) Mr. T. Gill contributes the results of investigations into the life-history of the sea-horses (*Hippocampus*), a subject which has hitherto received but little attention. One of the illustrations shows a male discharging the young from its brood-pouch. In the second (No. 1409) Mr. B. A. Bean describes and figures an adult specimen of the extraordinary Japanese goblin-shark (*Mitsukurina owstoni*). The third (No. 1411) contains a list, by Mr. H. C. Oberhölser, of birds collected by the well known traveller Dr. W. L. Abbott in the Kilimanjaro district, several of which are described as new. A descriptive list of a collection of caterpillars and chrysalises of Japanese Lepidoptera, by Mr. H. G. Dyar, constitutes the fourth fasciculus (No. 1412); while in the fifth (No. 1413) Mr. W. H. Asmead records Hymenoptera new to the Philippine fauna, with descriptions of new species.

PROF. A. GIARD, of the Sorbonne, has favoured us with separate copies of three articles by himself from vol. xxxix. of the *Bulletin scientifique de la France et de la Belgique*. In the first of these, entitled "Pœcilogonie," the author discusses whether in the case of organisms of which the adults are more or less similar to one another, while their embryogeny is different, more importance should be attached to the evolutionary dissimilarities or to the similarity of the adults. The title for the phenomenon is new. The second paper will delight the hearts of lovers of the oyster, the author remarking at the conclusion of this communication, which is entitled "La Prétendue Nocivité des Huitres," that he "could wish there existed in the world no other cases of typhoid save those induced by eating tainted oysters." In the third communication Prof. Giard discusses the drift (*tendance*) of modern morphology and its relations to other sciences.

A PAPER on the development of the ascus and on spore formation in the Ascomycetes, by Mr. J. H. Faull, published as vol. xxxii., No. 4, of the *Proceedings of the Boston Society of Natural History*, gives a detailed description of the nuclear changes for *Neotiella albocincta*, *Sordaria fimicola*, and a species of *Hydnobolites*. The origin of the asci was in most cases traced to the penultimate or terminal cells of ascogenous hyphæ, and it was found that the uninucleate stage of the young ascus was always preceded by a fusion of two nuclei. From his observations of the method by which the spores are delimited, the author favours the view that the ascus is homologous with a zoosporangium, and would derive the Ascomycetes from such a group as the Peronosporæ or Saprolegniæ.

IN a paper forming No. 1405 of the *Proceedings of the U.S. National Museum*, Mr. R. MacFarlane, the chief-factor of the Hudson Bay Company, contributes a series of highly interesting notes on mammals collected and observed in the northern Mackenzie River district, North-Western Territories of Canada. For two-and-forty years (1852-1894) Mr. MacFarlane was stationed as a post and district manager in these territories, and therefore had unrivalled opportunities for observing the fauna in its days of abundance. Unfortunately, as he himself confesses, except when stationed at Fort Anderson the author did not take full advantage of these opportunities either in the matter of collecting or observing; nevertheless, such

observations as have been recorded are of the highest interest and value, and one cannot help regretting that they were not published in a British or colonial serial, and also that the author's services were not long ago enlisted on behalf of the British Museum. The paper was, indeed, it appears, prepared to a great extent for publication at Cumberland House, the headquarters of Cumberland District, in the winter of 1890-1, but for various reasons it was not completed, and several sheets of the MS., together with various memoranda, were subsequently lost. The paper is a perfect mine of information with regard to the fur exports of the Hudson Bay Company in the old days.

Two memoirs have lately been published by the Carnegie Institution of Washington which contain results of interest in reference to problems of heredity. The first of these, by W. E. Castle, discusses the phenomena of coat characters in guinea-pigs and rabbits. Three alternative pairs of coat characters in guinea-pigs are shown to conform generally to Mendel's law. These are:—albinism *v.* pigmentation, smooth *v.* rough coat, and long *v.* short coat, the first named in each pair of characters being recessive with respect to the second. The author distinguishes between characters which are recessive and those which are latent; by the latter he means certain "dominant" features which depart from Mendel's law in being capable of renewed activity under certain conditions even in "recessive" gametes. The facts given in the paper supply abundant illustrations of the variety of conditions under which blended inheritance, as in Mendel's *Hieracium* experiments, may occur in place of the strict Mendelian segregation. In the second paper, which is by D. T. Macdougall, assisted by A. M. Vail, G. H. Shull, and J. K. Small, a full account is given of the various forms of *Oenothera* which have constituted the chief material for De Vries's "mutation" theory, and of the relation between them. It is shown that *O. lamarckiana* is in all probability a true and independent species native to America; and the authors record the re-discovery of the habitat of *O. grandiflora*, the place of habitat of which in the American flora had become doubtful. Both memoirs are well illustrated by woodcuts and half-tone plates.

DR. H. MIGLIORATO announces in vol. ii., part ii., of *Annali di Botanica* that he is preparing an analytical dictionary of vegetable teratology as a subsidiary work to Penzig's "Pflanzen Teratologie," and requests that workers in this subject will cooperate by sending copies of their papers to him at 89b rue Panisperna, Rome.

PROF. F. W. OLIVER, in an article in the *Biologisches Centralblatt* (June 12) on the newly discovered seeds of the Carboniferous ferns, summarises the results of recent investigations in fossil botany which have led to the formation of a separate group, the Pteridospermeæ, including the Lyginodendreæ and Medullosæ. The paper is illustrated with figures of sections and a model of the seed in its cupule of *Lagenostoma Lomaxi*.

WE have received from Brazil the first number of the *Revista da Sociedade Scientifica de São Paulo*. It contains the first instalment of a report, written in French, of a voyage made in 1825 by Hercules Florence from the Tiete to the Amazon by the Brazilian provinces of St. Paul, Matto Grosso, and Gran Para. There is also a valuable memoir on the Brazilian Tabanidæ, written in German, by Dr. A. Lutz, director of the bacteriological institute of the State of São Paulo. Lastly there is a paper, written in Portuguese, by Erasmo Braga, on the gold mines of Ophir.

THE seeding of pastures is a matter of primary importance to owners of grazing land, and it is certain that many farmers will obtain useful information from the experiments conducted under the direction of Mr. A. N. M'Alpine, which are described in Bulletin No. 31 of the West of Scotland Agricultural College. Fourteen different mixtures were tried, three containing rye-grass in excess, three without rye-grass, and four were special mixtures; of the latter Timothy and cock's-foot mixtures in suitable quantity were especially efficacious in checking Yorkshire fog and bent grass. With respect to rye-grass, it was demonstrated that both the perennial and the Italian varieties should be sparingly sown.

THE cultivation of oranges in Dominica is discussed by Mr. H. Hesketh Bell in No. 37 of the pamphlet series issued by the Imperial Department of Agriculture for the West Indies. Mr. Hesketh Bell has been growing oranges for some years on two experimental stations, and has shipped sample boxes at different times to England which have realised remunerative prices at Covent Garden. Experience has proved that budded oranges are much superior to seedlings, and the varieties "Parson Brown" and "Jaffa" are recommended as being hardy and prolific, while the "Washington Navel" also appears to thrive well. Emphasis is laid on the necessity for exercising the greatest care in handling and packing the fruit, so that Dominica brands may secure a good name on the market.

THE banana industry was unknown to Costa Rica twenty-five years ago, says a writer in the *Journal of the Society of Arts* (July 28), but it has reached such proportions, especially within the last few years, that bananas now form the main export of the country. At the close of 1904, about 50,000 acres were devoted to banana growing in Costa Rica. The trade was exclusively confined to the United States until 1902, when the fruit was exported to England, with gratifying results. France, Germany, Italy, Spain, and other European countries do not as yet consume the banana, but as soon as a substantial increase in the acreage is reached, and with the present facilities for transportation and the use of ships equipped with cold storage, the market will be extended probably to those countries. The amount exported from Port Limon during the five years ended with June 30, 1904, was as follows, in bunches:—1900, 2,804,103; 1901, 3,192,104; 1902, 4,427,024; 1903, 5,261,600; and 1904, 5,760,000. The following figures show the probable cost and profit on a tract of 100 acres planted in bananas. Original outlay:—land (4l. per acre), 400l.; reducing land and bringing it to a banana-bearing condition (10l. per acre), 1000l.; total, 1400l. Gross returns, 180 stems per acre per annum, 1116l. Expenses:—cutting and hauling the fruit, and keeping the plantation clean, 288l., manager (20l. per month), 240l.; total, 528l. Net return on investment, 588l. Under favourable conditions, a banana plant may give a stem of fruit in nine months, but it generally takes from fifteen to eighteen months for the average plantation to be in full bearing. The life of a plantation varies according to the fertility of its soil and topographical situation. Some soils may need a rest in six or seven years, while others may last practically for ever, as in cases where periodically enriched by alluvial deposits. It is understood that fine flour can be made from bananas, and that fibres from the leaves and stalks could be extracted and successfully worked, but as yet nothing in this direction has been done in Costa Rica.

THE *Engineering and Mining Journal* directs attention to the increasing tendency to use copper as the collecting agent instead of lead in smelting gold and silver ores. Smelting on the copper basis is decidedly cheaper than on the lead basis.

WE have received part i. of the annual report of the director of the Philippine Weather Bureau for the year 1903, containing hourly observations of atmospheric phenomena at the Manila Central Observatory. The assistant director contributes a useful climatological summary for the year, together with monthly and daily amounts of excessive rainfall that have occurred since 1865. Photographic illustrations are given of the havoc wrought by one of the two destructive cyclones which traversed the archipelago. Unfortunately, there was no good anemometer at any of the towns that suffered most severely. Manila itself escaped these violent storms.

THE Hamburg Meteorological Institute has issued vol. xiii. of "Deutsche überseeische meteorologische Beobachtungen," 1905. As may be inferred from the title, the work contains observations made at places abroad, under German control. In the present case it refers entirely to some twenty-two stations in German East Africa, and the tables have been prepared and printed with the liberal assistance of the Colonial Department of the German Foreign Office. It contains more than 300 pages of valuable observations, and is a very important contribution to the climatology of Africa, with explanatory details relating to each of the stations. For some of them hourly observations are given from self-recording instruments; at others eye observations have been made several times daily.

A PAPER entitled "Records of Differences of Temperature between McGill College Observatory and the Top of Mount Royal, Montreal," by Prof. C. McLeod, was read at the meeting of the Royal Society on June 8. The chief object of the paper was to show the advantage of Prof. Callendar's electrical recorders, in connection with the use of platinum thermometers, in obtaining trustworthy indications of the variations of temperature at a distance in a situation inaccessible for the greater part of the winter. The horizontal distance between the stations was 3300 feet, and the difference of altitude 620 feet. The first year's working (July, 1903, to May, 1904) showed that range of variation was considerable, and often changed very rapidly; on some occasions the temperature at the higher station was 6° F. or 7° F. above the lower, on others it was 25° below. A comparison of the records showed that any marked change of temperature at the lower station was almost invariably preceded by a similar change at the higher station at an interval of twelve to twenty-four hours. It is claimed, we think with fairness, that this system of recording meteorological data appears to overcome the difficulty and expense of maintaining a staff of observers at an inaccessible station.

At the last annual meeting of the Royal Meteorological Society, the president, Captain D. Wilson Barker, gave an interesting address, illustrated by a number of lantern slides, on the connection of meteorology with other sciences. He pointed out several of the most evident influences of meteorology to the geological observer, such as rain, ice, snow, &c., and the rock-splitting action of great changes of temperature. As regards zoology, the influence of meteorology on animal life is all-pervading. Among the most common results are mentioned the winter sleep of various animals, and the summer sleep of some fishes and

reptiles. Dr. Dickson, Dr. Mill and others are studying the effects of changes of climate on sea organisms generally. Agriculturists are more dependent on the weather than any other class of persons. Were it possible to issue forecasts for a longer period in advance, farmers would be much benefited. Captain Barker considers that the effect of weather upon health has not received a fair amount of scientific notice. While medical officers write voluminous reports on the public health, many of them ignore the meteorological conditions of the districts under review. We think we are justified in claiming exception for the reports of the various registrars-general, which contain carefully prepared meteorological statistics.

In the *Rendiconti* of the Lombardy Academy, xxxviii., 2, Prof. Ernesto Pascal gives a classification of the various forms of twisted sextic formed by the intersection of a quadric and a cubic, with special reference to the number of their real tritangent planes.

We have received the third edition of Dr. Richard Dedekind's pamphlet on "Stetigkeit und irrationale Zahlen," which may now fairly claim a place among the mathematical classics. It originated about the year 1858, when the author was charged with a course of lectures on the calculus, and found no satisfactory treatment of the continuity hypothesis in existence. On November 24, 1858, Dedekind discovered a definition of continuity which he imparted to Durège a few days later, and the present pamphlet was written in 1872 in commemoration of his father's jubilee.

In the Bulletin of the American Mathematical Society for June, Dr. Edward Kasner directs attention to a significant dialogue in Galileo's "Discorsi e dimostrazioni matematiche" of 1638, in which modern concepts of infinity as laid down by Bolzano, Cantor, and Dedekind appear to have been foreseen by that philosopher. In this dialogue Salviati points out to Simplicio that since every number has a square there must be as many squares as there are numbers, but, on the other hand, since there are many numbers which are not squares there must be more numbers than squares. In answer to Simplicio's question "What is to be our conclusion?" Salviati gives the following remarkable reply:—"I see no escape except to say: the totality of numbers is infinite, the totality of squares is infinite, the totality of roots is infinite; the multitude of squares is not less than the multitude of numbers, neither is the one greater than the other; and, finally, the attributes of equal, greater and less are not applicable to infinite but solely to finite quantities."

MR. J. J. HICKS, of Hatton Garden, has submitted a two-foot rule designed by Mr. Scott which is worthy of notice. When opened out like an ordinary carpenter's rule one face shows inches and sixteenths along one edge and millimetres along the other, while between them the divisions are repeated in juxtaposition for the purpose of more accurate comparison. It is the other face of the rule, however, where the greater novelty is to be found. Here there are four double comparison scales of English and French measures of length, weight, capacity, and fluid measure. Taking the first as an example of the system, a length of about 10 inches shows comparison quantities from 1 inch to 60 miles juxtaposed, but the divisions are not equispaced, as in that case nothing much less than a mile would be visible. They are therefore spaced logarithmically, so that the first inch covers a space of nearly half an inch. This is divided into eighths, and each

of these by estimation could be read to tenths. The next two inches occupy the same space, and so, of course, do the next four, and so on. In a distance of $1\frac{1}{2}$ inch or 38 millimetres, a reading is increased ten-fold. Of course such comparison scales have the advantage of the ordinary slide rule that at all parts of the scale readings are made with the same proportional accuracy. For instance, on the scale now referred to 1 inch is opposite 25 and a small half-millimetre, $11\frac{1}{2}$ yards is opposite $10\frac{1}{2}$ metres, 5 miles is half the thickness of the line beyond 8 kilometres, and similarly 50 beyond 80. In short, the accuracy with which any of these comparison scales may be read is the same as that which would apply to a slide rule in which the A line from 1 . . . 100 was 3 inches long. For quick and fairly accurate comparison of lengths, weights, cubic and fluid measures, this face of the rule is most convenient.

We have received several papers dealing with projects (not performances) of artificial flight the general character of which is sufficiently shown by the following brief summaries:—Arnold Samuelson, in a lecture published at Hamburg (London: E. and F. N. Spon), asserts that all flying animals (insects and birds) have flat, not curved, wing surfaces, that the normal air-pressure on a thin supporting plane is independent of the angle of incidence at which the plane moves forward, that the pressure on a rectangular plane decreases uniformly from front to back, giving a centre of pressure at one-third the distance from the front to the back surface, and other conclusions equally at variance with many generally accepted theories. Dr. Federico Sacco, in a paper entitled "L'Aerovoie" (Turin: P. Gerboni), proposes a captive balloon attached to a small trolley running along a kind of elevated cable railway as a cheap and rapid means of locomotion which would be unaffected by such trifling terrestrial obstacles as rivers, mountains and lakes; in windy weather a voyage on such an apparatus would doubtless be highly thrilling. For the argument of cheapness Dr. Sacco is responsible. M. René de Saussure, writing in the *Revue scientifique* for May 27, describes the "hélicoptère aéroplane" of MM. H. and A. Dufaux, which, roughly speaking, consists of a pair of double-surface gliders placed fore and aft, with two screw propellers arranged side by side between them rather nearer to the front than to the back gliders. Of this apparatus only small models have been tried, and a large sized machine 8 metres long and 3 metres broad which has been constructed has not yet been experimented on; the authors, however, give full details as to how to start the machine and to land safely. The latter operation, as shown in the diagram accompanying the article, bears a rather ominous resemblance to the motion of a dynamically unstable glider previous to capsizing. We cannot close the list without referring to a paper by Mr. F. W. H. Hutchinson, read at Cambridge and published in *Knowledge and Scientific News* for June, describing experiments on models with bird-like wings, which have already yielded some interesting results in the study of natural flight. The wings in this case were not assumed to be flat, but of the curved form, which the author describes as the "Hargreave curve."

MESSRS. WITHERBY AND CO. have issued the prospectus of a book on "The Birds of Hampshire and the Isle of Wight" which they have in preparation. The work is by the Rev. J. E. Kelsall and P. W. Munn, and is claimed to be the first complete history of the birds of Hampshire and the Isle of Wight published. The work will contain a large-scale coloured map, and be illustrated by reproductions of drawings and photographs.